

REMARKS

The Rejection of Claims 1, 2, 9, 13, 14, 17 18, 25, 29, 30 and 33-40 under 35 U.S.C. 103(a)

Claims 1, 2, 9, 13, 14, 17 18, 25, 29, 30 and 33-40 were rejected under 35 U.S.C. 103(a) as being unpatentable over the Applicant's own U.S. Patent 5,986,860 to Scott in view of U.S. Patent No. 3,857,069 to Howell. Claims 1, 17, 35 and 38 are the only independent claims in this group of claims.

The Examiner correctly observed that Scott did not teach the inclusion of a balancing core operatively associated with the pair of parallel load conductors to provide a differential current unbalance by inducing a canceling impedance. The Examiner, however, alleged that "It would have been obvious to one having ordinary skill in the art to modify the invention of Scott to include a balancing core operatively associated with a pair of parallel load conductors that provide a differential current unbalance by inducing a canceling impedance, as taught by Howell."

The teachings of Howell are very similar to many present ground-fault-circuit-interrupter circuits. Scott, however, relates to arc fault detectors, not ground-fault detectors. One skilled in the art, therefore, would not make a combination of Scott and Howell. The invention of Howell requires both a neutral ground wire and a load wire coupled with two toroids. An oscillator energizes one toroid and detects the signal in a second toroid and when a neutral-to-ground fault occurs. Without a neutral wire the Howell patent has no application, and thus cannot be combined with Scott, which has no neutral wire. Furthermore, if the Howell method were mistakenly applied to only the line conductor(s) of Scott, as the Examiner suggests, the resulting combination would only sense the connected load impedance-to-frame or a 4 ohm or less line-to-frame fault. This is not useful.

By contrast, claim 1 of the Applicant's invention requires "a single pair of substantially identical parallel insulated load conductors for each zone in which arcing is to be detected." Similarly, claim 17 requires "splitting a load conductor into a single pair of substantially identical parallel insulated conductors and electrically coupling and terminating the endpoints of said conductors." Claims 35 and 38 require "splitting a load conductor into a single pair of

substantially identical parallel insulated conductors.” The current sensor and the balancing core of the Applicant’s invention are required to be “operatively associated” or “configured and arranged” with said required pair of load conductors in all of the independent claims, 1, 17, 35 and 38. Thus, Applicant’s invention provides a unique fault detection system which can detect series faults, line-to-line faults and line-to-frame faults even when a frame is used for the neutral return path.

The mere existence of the secondary toroidal core auxiliary transformer 24 in Howell, does not suggest the balancing core of the present invention or its electrical relationship with the pair of load conductors and the current sensor of the present invention. For the foregoing reasons, Applicant respectfully submits that independent claims 1, 17, 35 and 38, as well as all claims dependent thereon, are not obvious over Scott in view of Howell and, thus, should be in condition for allowance.

The Rejection of Claims 3 and 19 under 35 U.S.C. 103(a)

Claims 3 and 19 were rejected under 35 U.S.C. 103(a) as being unpatentable over the Applicant’s own U.S. Patent 5,986,860 (Scott) in view of Howell and further in view of U.S. Patent No. 3,914,667 to Waldron.

The Examiner alleged that “it would have been obvious to one having ordinary skill in the art to modify the invention of Scott and Howell to include specifying that the current sensor comprise a Hall effect sensor as taught by Waldron” In addition to the discussion above, which distinguishes the Applicant’s present invention over any combination of Scott and Howell, it is pointed out that the combination of a Hall effect sensor with the invention of Howell itself produces an unworkable solution. Such a combination would reduce the effectiveness of the sensing core of Howell and, instead of sensing a 5 ma fault, it might begin to sense at 5 amps. The ground-to-neutral oscillatory circuit would, instead of finding 4 ohms, find perhaps a 0.004 ohm fault. Neither of these results is useful or appropriate in circuit fault detectors. Thus, combining the active circuitry as taught by Howell with Scott and Waldron can be seen to have undesirable results.

Therefore, claims 3 and 19, which are dependent on claims 1 and 17, respectively, should also be allowable for these additional reasons.

The Rejection of Claims 4-6 and 20-22 under 35 U.S.C. 103(a)

Claims 4-6 and 20-22 were rejected under 35 U.S.C. 103(a) as being unpatentable over the Applicant's own U.S. Patent 5,986,860 to Scott in view of Howell and further in view of U.S. Patent Application Publication No. 2002/0011832 A1 to Berkcan et al. Claims 4-6 are dependent directly or indirectly on claim 1. Claims 20-22 are dependent directly or indirectly on claim 17.

The Examiner alleged that "it would have been obvious to one having ordinary skill in the art to modify the invention of Scott and Howell to include specifying that the current sensor use a Rogowski coil, as taught by Berkcan..." The discussion above has described the non-obviousness of modifying the invention of Scott with the teachings of Howell in an attempt to produce the present invention. The addition of the Rogowski coil, as taught by Berkcan, does not address the deficiencies of that combination. Therefore, claims 4-6 and 20-22, which are dependent directly or indirectly on claims 1 and 17 respectively should also be allowable for at least the same reasons discussed above.

The Rejection of Claims 7 and 23 under 35 U.S.C. 103(a)

Claims 7 and 23 were rejected under 35 U.S.C. 103(a) as being unpatentable over the Applicant's own U.S. Patent 5,986,860 (Scott) in view of Howell and Berkcan and further in view of U.S. Patent No. 6,088,205 to Neiger.

The discussion above has described the non-obviousness of modifying the invention of Scott with the teachings of Howell in an attempt to produce the present invention. The addition of an integrating circuit and filter as taught by Neiger, does not address the deficiencies of that combination. Further, the circuit of Neiger cannot be combined with that of Scott alone, or Scott and Berkcan, for many of the same reasons as discussed with respect to the operation of the circuit of Howell. The circuit of Neiger also requires sensing of the load and neutral lines and cannot be used to monitor the bifurcated load lines used in Scott. Therefore, claims 7 and 23, which are dependent indirectly on claims 1 and 17, respectively, should be allowable.

The Rejection of Claims 8 and 24 under 35 U.S.C. 103(a)

Claims 8 and 24 were rejected under 35 U.S.C. 103(a) as being unpatentable over the Applicant's own U.S. Patent 5,986,860 (Scott) in view of Howell and further in view of U.S. Patent No. 5,410,504 to Berkcan.

The discussion above has described the non-obviousness of modifying the invention of Scott with the teachings of Howell in an attempt to produce the present invention. Including the measuring of the current signal using a current sensor comprising a resistive shunt that produces a voltage difference proportional to the measured current signal, as taught by Berkcan, does not address the deficiencies of that combination. Therefore, claims 8 and 24, which are dependent on claims 1 and 17 respectively should also be allowable for at least the same reasons set forth above

The Rejection of Claims 10-12, 15, 26-28 and 31 under 35 U.S.C. 103(a)

Claims 10-12, 15, 26-28 and 31 were rejected under 35 U.S.C. 103(a) as being unpatentable over the Applicant's own U.S. Patent 5,986,860 (Scott) in view of Howell and further in view of U.S. Patent No. 5,519,561 to Mrenna et al.

The discussion above has described the non-obviousness of modifying the invention of Scott with the teachings of Howell in an attempt to produce the present invention. Including a circuit breaker using a bi-metal current sensor and armature that moves by the magnetic core in response to a current difference, as taught by Mrenna, does not address the deficiencies of that combination. Therefore, claims 10-12, 15, 26-28 and 31, which are dependent directly or indirectly on claims 1 and 17 should also be allowable for at least the same reasons set forth above.

The Rejection of Claims 16 and 32 under 35 U.S.C. 103(a)

Claims 16 and 32 were rejected under 35 U.S.C. 103(a) as being unpatentable over the Applicant's own U.S. Patent 5,986,860 (Scott) in view of Howell and further in view of U.S. Patent No. 5,905,619 to Jha.

The discussion above has described the non-obviousness of modifying the invention of Scott with the teachings of Howell in an attempt to produce the present invention. Including a

relay responsive to the differential current and coupled to a circuit breaker for its operation, as taught by Jha, does not address the deficiencies of that combination. Therefore, claims 16 and 32, which are dependent on claims 1 and 17 respectively should also be allowable for at least the same reasons.

Claims 1-40 remain in this application.

It is believed that no fee is presently due; however, should any additional fees be required (except for payment of the issue fee), the Commissioner is authorized to deduct the fees from Jenkins & Gilchrist, P.C. Deposit Account No. 10-0447, Order No. 47181-00193USP1.

Respectfully submitted,

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